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Review Article

Relationships between self-esteem and posttraumatic growth among adolescents in the U.S.

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ABSTRACT

In response to highly stressful life events, positive psychological changes, known as posttraumatic growth (PTG), may occur in adolescents. Because PTG has been studied for the past two decades and yet it is still a relatively new concept, especially compared with posttraumatic stress disorder (PTSD), the current study tests if adolescents' knowledge of PTG and PTSD is associated with their PTG perceptions resulting from their highly challenging life circumstances, and if the knowledge moderates the relationships between self-esteem and PTG in adolescents. High school students (N = 196) who experienced at least one stressful life event within the past three years completed the Posttraumatic Growth Inventory and Rosenberg Self-Esteem Scale, and indicated the level of knowledge regarding positive changes (PTG) and negative consequences (PTSD). Results indicated that self-esteem was positively associated with PTG but only for adolescents who have a lower level of PTG knowledge, supporting the importance of previous knowledge to the perceptions and experiences of PTG. These findings suggest future research should look at the role of proximate cultural elements in PTG, because the notion of benefits out of adversity is likely to be influenced by socio-cultural factors.

Keywords: Posttraumatic growth, Self- esteem, Adolescence

Introduction

'Only a crisis actual or perceived produces real change. When that crisis occurs, the actions that are taken depend on the ideas that are lying around' [1]. Although the change Friedman was referring to was regarding political policies, not psychological principles, this quote illustrates how academics from various disciplines converge on the idea that remarkable change may occur as the result of facing crises. The changes adolescents experience partly depend on what ideas, knowledge, or resources they have. The main purpose of this study is to introduce one resource that we suggest may be missing from the current literature on adolescents' responses to crises or stressful life events – knowledge of the 'posttraumatic growth' phenomenon [2].

Since the diagnosis of 'posttraumatic stress disorder (PTSD)' was introduced in 1980, an overwhelming number of studies have revealed the predictors, outcomes, and the mechanisms of the negative changes that adolescents may experience following highly stressful life events [3,4]. In reality, however, adolescents can change in both negative and positive ways. For the past two decades, a growing number of studies have reported that positive psychological changes can also occur as children and adolescents struggle with their stressful life events [5,6]. These life events include the September 11th terrorist attacks, cancer, natural disaster such as earthquake, and other diverse events including death of a loved one, health problems, or relationship problems [7-10]. The positive psychological changes that arise following these stressful life events have been termed posttraumatic growth (PTG, [11]).

Focus group interviews with adolescents who are coping with parental cancer exemplify this PTG phenomenon [12]. In their study, one person reported, 'I look at life in a different way; there is no guarantee to be a walk through the park for anyway or anybody. […] I'm not gonna take life for granted', showing how adolescents may develop a deeper appreciation of life. Another person noted that the effect of having a parent with cancer was '[to make] me a responsible person'. In addition, some of their participants reported that they changed their attitudes and behaviors by increasing awareness of the presence of cancer in their lives. These narratives demonstrate the possibility of producing a wide array of positive outcomes or PTG experiences. Because studies have revealed that PTG is associated with subsequent reductions in emotional distress such as depression, anxiety, and hostility, suicidal ideation, and substance use, it is important to identify a parsimonious set of

predictors explaining PTG, toward developing an intervention program for adolescents [6,9,10].

One predictor that has been suggested to explain PTG, and relevant to adolescents, is self-esteem. Self-esteem is often thought of as a personal or inner resource that a person has. It refers to the value of sense of worth one perceives about one's self [13]. Generally speaking, therefore, adolescents who have high self-esteem should be able to experience positive changes when facing stressful life circumstances because they are equipped with inner resources that allow them to better cope with adversity. Many studies have supported this notion by showing a positive association between self-esteem and PTG [14-16]. Dolbier, et al., [17] for example, investigated the effectiveness of a resilience intervention program and suggested pre-intervention personal resources including self-esteem predicted growth in a sample of college students. Also, more indirectly, research has supported this association by including self-esteem as part of a composite score for resilience and competence [18,19]. These studies all suggest that people with higher self-esteem are likely to report greater growth, because self-esteem is an important inner resource that facilitates PTG.

However, some studies, although limited to those that focused on the transition to parenthood and grandparenthood as the stressor preceding growth, suggested a negative association between self-esteem and growth [20,21]. In these studies, people with higher self-esteem experienced less growth, perhaps because they did not perceive the event as severe enough to make them struggle to initiate PTG processes [22]. In addition, other studies seem to indicate that self-esteem does not contribute to a higher level of growth [23]. These studies propose that self-esteem may contribute to lowering the negative symptoms that follow adversity, but ultimately may not increase growth, at least in a sample of adults [24].

These mixed results, coupled with a relatively small effect size of self-esteem in relation to PTG, raise a question. First, there is a strong focus in the current literature on targeting adults when studying PTG [18,22]. Since some of these studies focus on the transition to parenthood or grandparenthood, particularly the ones supporting the argument that the two are inversely associated with each other, these results may not apply to populations other than people experiencing childbirth [20]. Second, most studies include responses to only one specific event, mainly related to physical conditions, such as chronic illness, coronary heart disease, Ménière's disease or HIV/AIDS [18,19,23,25]. In order to gauge how self-esteem affects PTG in adolescents more generally, we need to consider a wide array of events that the youths are likely to experience. Third, although at least two studies assessed a number of diverse events in non-specialized population and supported a positive association between self-esteem and PTG, whether self-esteem is associated with PTG regardless of other inner or personal resources, that is, the possible interaction effect that self-esteem may have, has not been investigated [14,17].

In order to resolve these limitations, we suggest that the previous knowledge of PTG – another important personal resource – should be taken into consideration as a possible PTG catalyst. This key word, PTG or posttraumatic growth, was first introduced in 1995 [26]. Since then, more than four hundred peer-reviewed articles and more than ten books have been published with the titles including PTG. Although it is still relatively new, people have started recognizing this phenomenon through mass media or internet. When considering sociocultural influences on PTG, Calhoun, et al., [27] explain that those who have had direct contact with someone who experienced PTG are more likely to perceive their own growth. Phrases associated with personal growth that are present in some socio-cultural groups, for instance, may foster growth as well. One such example might be 'What doesn't kill you makes you stronger.' Considering this phrase, among others (e.g., 'Everything happens for a reason'), is known to some people in Western culture, people should be responding to stressful events if they are familiar with these phrases and terms in a consistent manner.

Additionally, people who experienced stressful events and know a person who experienced positive changes as a result of facing a similar event are more likely to grow than people who do not know such a person [28]. This may be also due to the availability of PTG themes within a person's primary reference groups. Reference groups are people with whom one belongs, such as family, friends, or religious groups, and are suggested to influence PTG as a proximate cultural factor [29,30]. If a person's reference group has shared the narratives about how people may experience PTG, this will reflect on a person's actual experiences with crises, being also consistent with the studies showing the significant impact of shared experiences in PTG [31]. Taken together, the previous studies on sociocultural influences on PTG suggest that knowing about the possibility of growth may facilitate the recognition of own PTG.

In the current study, we hypothesize that in addition to the direct possible role of previous knowledge of PTG in perceptions of growth, knowledge may explain why the mixed relationships between self-esteem and PTG have been obtained in the past studies. If adolescents already know about the PTG phenomenon, they are more likely to perceive their own growth. In other words, regardless of the level of self-esteem, as long as they are familiar with the theme of positive changes resulting from trauma, they are likely to perceive their own growth because the knowledge they have should foster their perceptions. However, for people with no knowledge of PTG, self-esteem should have a positive association with PTG, being consistent with the studies demonstrating that low inner resources are related to lower PTG [15,17].

In order to test the effects of self-esteem and previous PTG knowledge on PTG in adolescents, there are several factors that need to be controlled for. Although PTG literature in adolescents suggests numerous factors that are likely to explain PTG processes such as ruminative thinking or religious involvement, the current study focuses on the following four variables: gender, age, self-disclosure, and perceived stressfulness of the triggering event [32,33]. First, although Meyerson, et al. [33] reported mixed results for gender differences in adolescent PTG, a meta-analysis of 70 studies suggests that females report higher PTG than males [34]. Findings regarding age differences

are also mixed such that some studies find that as one grows older, he/she experiences higher PTG, others found a negative association between age and PTG, while some found no relationships [35-37]. Additionally, as perceived stressfulness of the triggering event increases, PTG should increase, because PTG is likely to occur as a result of a 'highly stressful' life event [38]. Finally, disclosing about what had happened has been suggested to facilitate PTG perceptions [39,40]. Controlling for these known predictors of PTG will allow us to better investigate the associations between self-esteem, previous knowledge of PTG, and perceptions of PTG in the current study.

Overview and hypotheses

The purpose of the current study is to expand previous research on correlates of PTG in an adolescent population by testing the hypothesized relationships between self-esteem, knowledge of PTG and PTG perceptions, while controlling for the known predictors such as gender, age, stressfulness of event, and disclosure. To our best knowledge, this is the first study examining these variables in adolescents. Because it has been approximately twenty years since PTG was introduced to public, and the awareness of this phenomenon has been gradually rising, partly due to the Positive Psychology movement, a study assessing the role of its knowledge is also timely. Based on the previous findings, we have four hypotheses to test.

Hypothesis 1: Demographic variables (age and gender), disclosure, and perceived stressfulness of the triggering event will account for a significant portion of variance in PTG.

Hypothesis 2: The addition of self-esteem, an important inner resource for adolescents as a predictor, will significantly improve the model explaining PTG. Higher self-esteem will be associated with higher PTG and the impact of self-esteem will be greater than the roles of demographic variables, disclosure, and perceived stressfulness of the triggering event.

Hypothesis 3: The addition of previous knowledge of PTG, another important resource and an indicator of proximate cultural factor, will also significantly improve the model. Higher knowledge of PTG will be associated with higher PTG.

Hypothesis 4: Previous knowledge of PTG will moderate the effect of self-esteem on PTG. The role of self-esteem will only be observed for people with low level of PTG knowledge.

Method

Participants

The current sample consisted of 196 high school students from two high schools in the Midwestern United States (117 were female, 77 were male, and two did not report their gender). The age range was 13 to 19 (M = 15.75, SD = 1.13). The racial/ethnic composition of the participants was primarily Caucasian (72.4%), followed by African American (13.3%), American Indian/Alaska native (2.7%), Asian or Middle Eastern (2.7%), and other (8.9%). A large majority of the participants identified as Christian (69.9%). Participants experienced a wide variety of highly stressful life events within the past three years. The events identified as the focus when completing the other measures included family issues such as parental illness or divorce (n = 52), death of someone close to them (n = 50), accident or injury (n = 25), and other such as betrayal or friendship ending (n = 46). Approximately 11% (n = 23) reported that they did not experience any stressful life event within the past three years. Participants were excluded from the following analysis if they were older than 18 (n = 1), younger than 14 (n = 4), or had not reported their age (n = 3) or gender (n = 1). One outlier was identified (studentized residual of greater than +2.50) and was thus excluded. The resulting sample used for the current analyses included 186 participants. A full breakdown of sample characteristics can be seen in Table 1.

Procedure

Following informed consent from both the participant and the parent or guardian, participants were asked to complete a paper and pencil survey in a group setting. The survey took about 20 to 30 minutes to complete. During this time, participants completed demographic measures (e.g., age, gender, ethnicity) and were asked to report whether they had experienced a highly stressful life event in the previous three years as well as some details about the event (e.g., perceived stressfulness when it happened and disclosure). Participants then completed a measure of self-esteem (Rosenberg Self-Esteem Scale) and PTG (Posttraumatic Growth Inventory), as well as reported their knowledge of both PTG and PTSD. Participants did not receive any compensation for participation in this survey. This study was approved by the university's institutional review board.

Measures

Stressfulness of Event: The perceived stressfulness of the event was assessed using a single item that has been used in PTG literature [38,40], 'How stressful was the event during the time it took place?' Participants responded to this question using a 7-point scale (1 = not at all stressful to 7 = extremely stressful).

Table 1. Sample Characteristics

Gender	**N**	**%**
Male	73	39.2
Female	113	60.8
Religious Affiliation		
Christianity	129	69.4
Non-religious	18	9.7
Other	30	20.9
Ethnicity		
White	136	73.1
African American	24	12.9
Indented as African American	26	14
Traumatic Event		
Accident or Injury	23	12.4
Family Issues	52	28
Death of Close Other	46	24.7
Move or Change Schools	12	6.5
Friendship Problems	13	7
Other	40	21.4

Disclosure: Disclosure was assessed as a dichotomous variable. Participants were asked to report whether or not they had spoken about the event they identified using the item, 'Have you spoken about this event, to anyone?' (1 = yes or 2 = no).

Self-Esteem: Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES; [41]). Participants were asked to respond to 10 items (e.g., 'I feel that I have a number of good qualities') using a 4-point scale (0 = strongly disagree to 3 = strongly agree). Five items are categorized as reverse items because of the negative nature of the questions (e.g., 'I wish I could have more respect for myself'). These items were recoded so that the scale ranged from 0 to 30 with higher scores indicating higher feelings of self-worth. Internal consistency for this scale was satisfactory with a Cronbach's alpha of .87 for the current sample.

Previous Knowledge: Previous knowledge of posttraumatic growth (PTG) was assessed using a single item. For the purpose of the comparison, previous knowledge of posttraumatic stress disorder (PTSD) was also assessed using a single item. The questions were, 'Please indicate what you think your knowledge of "posttraumatic growth" is' and 'please indicate what you think your knowledge of "PTSD" is.' Both items were scored on a 10-point scale (1 = no knowledge to 10 = extensive knowledge).

Posttraumatic Growth: A level of perceived PTG was assessed using the Posttraumatic Growth Inventory (PTGI; [11]). The PTGI is one of the most commonly used measurements for assessing personal growth. The PTGI has been used in adolescent populations [33,42]. The PTGI is a 21-item inventory that measures five domains of growth, which include personal strength (e.g., 'I know better that I can handle difficulties'), appreciation of life (e.g., 'I can better appreciate each day'), new possibilities (e.g., 'I developed new interests'), relating to others (e.g., 'I have a greater sense of closeness with others'), and spiritual change (e.g., 'I have a stronger religious faith). Participants were asked to identify the degree to which they did or did not experience the particular change (0 = I did not experience this change as a result of my crisis to 5 = I experienced this change to a very great degree as a result of my crisis). The score range for the total PTGI is 0 to 105 with higher scores indicative of greater growth. Although the PTGI can be used with scores on the five domains, the current study only assesses total PTG. A Cronbach's alpha of .92 for the current sample demonstrated good reliability.

Data Analysis: Following the application of the exclusion criteria, the remaining sample (n = 186) was used for analysis. Correlations and descriptive statistics were first obtained to determine the relationships between the study variables: perceived stressfulness of event, disclosure, self-esteem, knowledge of PTG, knowledge of PTSD, and PTG. A hierarchal regression analysis was then conducted to test a series of hypotheses by assessing the impact of self-esteem, knowledge of PTG, and the interaction between self-esteem and knowledge of PTG beyond known predictors (gender, age, stressfulness of event, and disclosure). Finally, a simple slopes analysis was conducted to determine the nature of the interaction effect found in the regression analysis.

Results

Descriptive Statistics

Overall, the participants experienced a wide range of stressful life events and identified one focal event, with an average perceived stressfulness of 5.85 (SD = 1.23, range of 1 to 7), to complete the relevant inventories such as PTGI. The mean of the PTGI was 56.97 (SD = 21.23, range of 0 to 105). In this inventory, 7.40% of participants had scores of less than 21, suggesting that on average either no growth or a small degree of growth had been perceived; 12.20% of participants reported a level of growth between 22 and 42, suggesting that a small degree of growth had been perceived; 37.40% of participants reported a level of growth between 43 and 63, indicating a moderate level of growth; 31.90% of people reported a level of growth between 64 and 83, indicating a great degree of growth; finally, 8.00% of participants reported a level of growth higher than 84, suggesting that a very great degree of growth had been recognized. The mean of the RSES was 19.55 (SD = 5.84, range of 0 to 30), with many participants (73.80%) reporting a level of self-esteem between 15 and 30. The majority of participants also reported having spoken to someone about the event they experienced (77.40%). Most participants (62.90%) had no previous knowledge of PTG whereas only 5% of participants had no previous knowledge of PTSD. Most people reported that their knowledge of PTSD was somewhere between 5 and 7 (59.20%; range of 1 to 10).

Correlations among the study variables were obtained. As expected, people who disclosed about the stressful life event perceived higher level of PTG ($r = -.17$, $p = .034$). Self-esteem was positively correlated with PTG ($r = .21$, $p = .009$). Knowledge of PTG was positively correlated with knowledge of PTSD ($r = .20$, $p = .007$), suggesting that people who know about PTG are likely to also know about PTSD. Perceived stressfulness of the event was negatively correlated with self-esteem ($r = -.17$, $p = .038$). Means, standard deviations, and correlations for the study variables are presented in Table 2.

Hierarchal regression analysis predicting PTG

A hierarchal regression analysis was conducted to test the hypotheses. Demographic variables (age and gender), perceived stressfulness of the event, and disclosure were entered first into the model explaining PTG. Self-esteem was entered second. Previous knowledge of both PTG and PTSD were entered as the third step. An interaction term between previous knowledge of PTG and self-esteem was entered as the fourth step. All of the predictors were centered to minimize multicollinearity issues. The resulting models are presented in Table 3.

`At step one, the overall model was significant, $F(4,135) = 2.46$, $p = .048$, and accounted for 6.8% of the total variance of the PTGI. The only significant predictor in this first model was disclosure ($\beta = -.18$, $p = .031$) indicating that participants who spoke about the event were more likely to experience higher levels of growth.

Inclusion of self-esteem in step two significantly improved the model ($R2$ change = .04, $p = .023$) and resulted in an overall

Table 2. Means and Zero-Order Correlations for Study Variables

	M (SD)	Range	1	2	3	4	5	6
1. Stressfulness of event	5.85 (1.23)	1 – 7	-	-0.08	-.17*	0.09	0.05	0.1
2. Disclosure	1.17 (0.38)	1 – 2		-	-0.02	0.13	-0.01	-.17*
3. Self-esteem	19.55 (5.84)	0 – 30			-	-0.08	-0.03	.21*
4. Knowledge of PTG	2.00 (1.68)	1 – 10				-	.20*	0.15
5. Knowledge of PTSD	5.57 (1.95)	1 – 10					-	0.05
6. Posttraumatic Growth	56.97 (21.23)	0 – 105						-

Note: * p < .05. The score range for each variable was as follows: stressfulness of event (1 = not stressful, 7 = extremely stressful), disclosure (1 = yes, 2 = no), knowledge of PTG and of PTSD (1 = no knowledge, 10 = extensive knowledge).

Table 3. Hierarchal Regression Model Predicting Posttraumatic Growth

	Step 1			Step 2			Step 3			Step 4		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Constant	58.02	1.63	-	58.13	1.61	-	58.55	1.58	-	58.27	1.56	
Gender	-5.47	3.45	-0.13	-3.79	3.47	-0.09	-2.93	3.39	-0.07	-2.88	3.35	-0.07
Age	2.1	1.59	0.11	1.61	1.58	0.09	1.86	1.55	0.1	2.39	1.56	0.13
Stressfulness of Event	0.69	1.36	0.04	1.25	1.36	0.08	1.15	1.35	0.07	1.42	1.33	0.09
Disclosure	-9.58	4.39	-.18*	-9.16	4.33	-.18*	-11.97	4.31	-.23**	-12.2	4.26	-.23**
Self-Esteem				0.66	0.28	.20*	0.73	0.28	.22*	0.74	0.28	.22**
Knowledge of PTG							3.37	1.1	.26**	3.11	1.09	.24**
Knowledge of PTSD							-0.21	0.9	-0.02	-0.27	0.89	-0.03
Knowledge of PTG × Self-Esteem										-0.34	0.17	-.17*
R2 (adj. R2)	.07 (.04)			.10 (.07)			.16 (.12)			.19 (.14)		
R2 change				.04*			.06*			.03*		
Model F	2.46*			3.09*			3.69**			3.83***		

Note. N = 140. B = unstandardized beta weight; SE= standard error; β = standardized beta weight.
* p< .05. ** p < .01. *** p< .001.

significant model, F (5,134) = 3.09, p = .011. Significant predictors were: disclosure (β = -.18, p = .036) and self-esteem (β = .20, p = .023).

At step three, previous knowledge of PTG and PTSD were entered. The overall model was significantly improved (R2 change = .06, p = .010), F (7, 132) = 3.69, p = .001. Significant predictors included: disclosure (β = -.23, p = .006), self-esteem (β = .22, p = .010) and knowledge of PTG (β = .26, p = .003).

Lastly, the addition of an interaction term significantly improved the model (R2 change = .03, p = .043) and resulted in an overall significant model, F (8, 131) = 3.83, p < .001. The final model explained 19% of the variance of the PTGI total score. Significant predictors were: disclosure (β = -.23, p = .005), self-esteem (β = .24, p = .008), knowledge of PTG (β = .24, p = .005), and the interaction between self-esteem and knowledge of PTG (β = -.17, p = .043).

Simple slopes analysis testing for moderation of PTG knowledge

Simple slopes for the association between self-esteem and PTG were tested for low (-1 SD below the mean) and high (+1 SD above the mean) levels of knowledge of PTG [43]. The simple slope test for low knowledge of PTG revealed a significant association between self-esteem and PTG (b = 1.30, SEb = .39, β = .39, p = .001) whereas the simple slope test for high knowledge of PTG revealed a non-significant association between self-esteem and PTG (b = .17, SEb = .39, β =.05, n.s.), supporting the hypothesis.

Discussion

The purpose of this study was to examine the direct role of self-esteem and previous PTG knowledge on PTG perceptions, as well as mediating role of PTG knowledge on the relationships between self-esteem and PTG. For the most part, PTG studies have been centered on adults; thus, the importance of studying PTG in adolescents has been highlighted [33]. To the authors' knowledge, the current study was the first to take previous knowledge of PTG into consideration when examining PTG. Our purpose was to demonstrate the importance of both self-esteem and previous knowledge as personal/inner resources that foster PTG perceptions, and how they may or may not interact to influence PTG. Overall, the mean levels for PTG and self-esteem were consistent with past research on adolescents [10,44]. As expected, the majority of the participants had some knowledge of PTSD, and less than half of the participants (37.1%) had some knowledge of PTG. Given that this number was nearly zero in 1990s, it is reasonable to expect an increase, which in turn may underline the importance of studying the role of knowledge on growth.

The hierarchical regression analysis revealed that four known predictors of PTG (age, gender, disclosure, and perceived

stressfulness of the triggering event) accounted for a significant portion of the variance in the PTGI score, in support of our first hypothesis. Disclosure emerged as an only significant predictor of PTG, consistent with previous findings on disclosure [40]. In the current study, the majority of participants reported having spoken to someone about the stressful life event they experienced (77.40%) and they were likely to perceive a higher level of PTG. One possible reason is that talking about the event may increase deliberate rumination (i.e., purposefully and constructively reexamine the experiences) or meaning making, which then is likely to foster PTG perceptions [38]. Because disclosure was assessed as a dichotomous variable in the current study, if we additionally measured not only whether they disclosed about the event, but how they disclosed or what responses they received when they disclosed, we would be able to more meaningful report on the relationship between PTG and disclosure. For instance, it was suggested that people who perceive the disclosure recipient as mutually disclosing (i.e., expressing shared experiences) report more PTG than those whose disclosure recipients respond in a confused manner [40]. Thus, to fully understand the role of disclosure, future studies should assess the possible role of dyad and interactive relationships between discloser and disclosure recipients on PTG.

Unlike some of the previous studies, gender, age, and perceived stressfulness of the triggering event did not emerge as significant predictors of PTG. This is inconsistent with the overall meta-analytical results regarding gender differences in PTG [34]. However, they also revealed that women reported incrementally more growth than men as the mean age of the sample increased and concluded that gender differences in PTG were the most prominent around the age of 35. The current results suggest that the gender differences in PTG during the adulthood may not be applicable to the adolescents, and perhaps it is too early to see emerging gender differences in PTG. Also, age was not a significant predictor on PTG in the current study. This is somewhat surprising, knowing that cognitive development is likely to foster PTG perceptions and older adolescents are more likely to report higher PTG [45]. As meta-analytical results have also indicated the mixed findings of age differences in PTG, one's age at the time of the event, as opposed to one's age at the survey point, may be more important [33]. Although non-significant, the small positive association between perceived stressfulness of the event and PTG is consistent with the previous literature [8]. The more stressfulness the triggering event was, the more likely PTG was experienced.

Self-esteem emerged as a significant positive predictor of PTG, and influenced PTG above and beyond the set of predictors such as gender, age, disclosure and perceived stressfulness of the event, supporting the second hypothesis. This is consistent with the body of literature that suggests that self-esteem is an important inner resource that allows people to constructively cope with stressful life events [15,19,35]. Due to the cross-sectional research design, it may be true that PTG predicts self-esteem. It is plausible that if a person has a higher level of self-esteem as a baseline, he or she is likely to experience PTG, which in turn leads to an elevation in self-esteem, and it may serve as a protective factor in the future stressful experiences. Thus, this cyclic association may demonstrate that the direction in which we studied PTG and self-esteem is simply one important half to a complex relationship.

The current study also revealed that more previous knowledge of PTG was associated with higher levels of PTG perceptions, in support of our third hypothesis. This is consistent with the idea that themes and expectations regarding responses to highly stressful life events that are present within a person's reference groups influence a person's experience with PTG. This result highlights the importance of psycho-educational program. Teaching how people may or may not grow psychologically as a result of life crises seems just as important as teaching how people may or may not experience negative changes. Intervention's effect on PTG have not been firmly established yet [46]. The future intervention program specifically designed to target PTG may be effective when it contains the explanation of PTG itself.

The most important contribution of the current study is the interaction between knowledge of PTG and self-esteem on PTG perceptions. The nature of the interaction was supported by a simple slopes analysis indicating that for people with high levels of previous knowledge of PTG, self-esteem was not important for perceiving growth. However, for people with low knowledge of PTG, self-esteem was important for perceiving growth, supporting our fourth and final hypothesis. Our results suggest that people with low self-esteem and low knowledge of PTG are the most at risk for not perceiving PTG. On one hand, these findings demonstrate the benefit of considering both self-esteem and previous knowledge of PTG, as inner/personal resources, when developing interventions for eliciting PTG in adolescents. This style of psycho-educational intervention designed to increase knowledge may be more practical than developing an intervention designed to increase self-esteem. Although important to well-being, self-esteem would be much more difficult and time intensive to increase. Thus, for the purpose of increasing PTG alone, the current results suggest that increasing knowledge of PTG would be one way and relatively simple step to incorporate high school settings.

On the other hand, the current results indicate the significant role of creating sub-cultures or reference group that contain the PTG theme. Kilmer, et al. [17] suggests that 'children could benefit meaningfully (perhaps even reducing the likelihood of posttraumatic distress and symptomatology and, in turn, PTG) from systematic efforts to modify community norms and understanding and improving supportive and humane responses across domains (e.g., in schools, one's neighborhood, one's faith-based community)'. This will take time; however, in doing so, adolescents who experience highly stressful life events, and who have low self-esteem, may be more able to perceive their

own growth, just like those with high self-esteem. Given that the current results have demonstrated the significant role of disclosure in PTG, the reactions of disclosure recipients may also interplay with sociocultural elements. If members of the adolescents' primary reference groups are familiar with the PTG theme, their reactions toward disclosure may be different. Furthermore, we suggest that because PTG and self-esteem may have a cyclic relationship, if we are able to increase knowledge of PTG by developing a psycho-educational intervention program or foster the proximity to PTG theme by gradually changing the sub-culture that will lead to PTG, which in turn may affect the subsequent self-esteem.

Limitations and future directions

There are several limitations that should be considered when interpreting the results. This study was a cross-sectional design. Therefore, it cannot be determined that higher self-esteem and higher previous knowledge of PTG, along with their interactions, cause PTG. Second, results from this study are limited in generalizability. The sample was made up entirely of high school students from a Midwestern United States, and is therefore not possible to say whether studying other populations (e.g., adults, children, and those from different countries) would yield similar findings. Still, we find the application of this knowledge to high school students useful, as experiences with stressful events during adolescence may be particularly challenging. A final limitation was that self-esteem was constituted as being high or low based on the reported score, being consistent with the majority of the past studies [47]. However, a body of evidence has also suggested that self-esteem is more complex and that there is possibility for it to be fragile or secure, depending on its stability [48,49]. People with secure self-esteem have views about themselves that are true and resilient. However, people with fragile self-esteem have views about themselves that are easily threatened by external factors. This may be important to PTG research because following the experience of a stressful life event, a person with fragile self-esteem would likely experience threats to their feelings of self-worth more than a person with secure self-esteem. This may be even more relevant for people who experience certain interpersonal crises (i.e., friendship ending, betrayal, bullying, and relationship problems) that are salient to teenagers, because some people who have fragile self-esteem evaluate their self-worth on how they are viewed by others [50,51]. These interpersonal traumas may result in a heavier blow to the adolescents' self-esteem and they may then not be likely to experience as much PTG as people with stable self-esteem. Therefore, the nature of the relationship between self-esteem and PTG may be more complex and would benefit from further work focusing on self-esteem stability.

One future avenue is the difference between knowing the term PTG and having sociocultural influences regarding PTG. For example, more than half of the current sample of people had never heard of the term PTG. However, we expect that a lot of these people, despite not knowing the term itself, have experienced sociocultural influences regarding these positive changes [38]. Instead of asking teenagers about their knowledge of the term itself, future studies may explore the possible sociocultural influences by focusing on narratives or observations. It is possible for adolescents to witness people going through these positive changes, to hear phrases that depict these growth experiences, or to watch television shows, movies, or read books that follow people through hardship. In all of these experiences, it is conceivable that adolescents have been exposed to PTG without realizing or embracing the possibilities for themselves. By asking them about these less academic and more approachable experiences and incorporating them into a psycho-educational intervention program, we may be able to develop greater strategies for fostering growth [52].

Conclusion

In sum, the current study may be applied to move forward on research projects and interventions targeting how knowledge of PTG and self-esteem impact PTG. Future work should assess the impact of these variables in a longitudinal experiment that tests for the impact of an intervention based on having people realize their own knowledge of PTG that can be drawn from sociocultural influences.

Conflict of interest

The Authors declare that there is no conflict of interest.

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